



2019 Kansas WIC
Conference

ADDRESSING THE FOOD SAFETY NEEDS OF HIGH-RISK POPULATIONS

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KANSAS STATE
UNIVERSITY

AFFILIATION & FINANCIAL DISCLOSURE

The Center and other research has been funded, in part, with Federal funds from the U.S. Department of Agriculture. The contents of this presentation do not necessarily reflect the views or policies of the U.S. Department of Agriculture nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

SESSION OBJECTIVES

1. Understand the current food safety research being conducted at Kansas State University
2. Understand applications of food safety research in diverse practice settings for at-risk populations

WHY?

1. 1 in 6
2. 3,000
3. \$15.6 BILLION

CDC, 2018
<https://www.cdc.gov/foodsafety/cdc-and-food-safety.html>

SELECTED STUDIES & INITIATIVES

- Children
- Consumers
- Possible message
 - Behavior Change
 - Training & Counseling Effectiveness
 - Gaps



FOOD SAFETY AGENDA & FUNDING

- (2017+). Center for Research in Child Nutrition Programs. USDA-FNS. \$1.8M
- (2011-2017). Center of Excellence for Food Safety Research in Child Nutrition Programs. USDA-FNS. \$4.0M+
- (2013). Mitigating Risks of Foodborne Illness Associated with Handling Leafy Greens in Retail Foodservice Establishments Serving Aging Populations. USDA-AFRI/NIFA. \$424,846.
- (2012). Impact of Food Safety Messages on the Food Handling Behaviors of Parents of Young Children. United States Department of Agriculture. \$500,000.
- (2011). Current Practices and School Foodservice Directors' Knowledge and Attitudes about Food Allergy Training. American Dietetic Association Foundation, Allene Vaden Memorial Grant for Foodservice Management Research. \$5,000.
- (2011). Advancing Food Allergy Education for Hospitality Management and Dietetics Students using Storytelling. USDA, Higher Education Challenge Grant. \$140,168.
- (2010). Assessment and Reduction of Produce Food Safety Risks in School Foodservice Systems. USDA-CSREES Food Safety Initiative Program. \$800,000.

CHILDREN

THE CENTER FOR FOOD SAFETY IN CHILD NUTRITION PROGRAMS

THE CENTER 1.0 (2011-2017)

The Center of Excellence in Food Safety Research in Child Nutrition Programs

Mission

To conduct food safety research that meets the needs of Food and Nutrition Service's nutrition assistance programs using an interdisciplinary team approach and to disseminate results to a variety of targeted audiences.

Vision

The vision of the center is to provide leadership in advancing food safety research and practices within Food & Nutrition Service's nutrition assistance programs.

THE CENTER 2.0 (2017-CURRENT)

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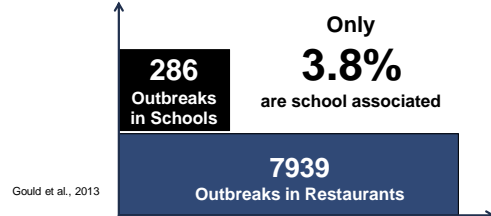
HISTORY...



November 19 -
December 30, 2009



OUTBREAKS IN SCHOOLS 1998-2008



ILLNESSES IN SCHOOL OUTBREAKS

38

Illnesses
per
outbreak
in
schools

Gould et al., 2013

5

Illnesses per
outbreak in
restaurants

FINLEY ELEMENTARY SCHOOL

- Taco meat found as the cause of *E. coli* O157:H7 outbreak in 11 children.
- 9 confirmed cases of illness
- \$4.75 million
- Leftover taco meat from the meals, but investigators noted "golf ball" sized chunks of leftover ground beef with pink, undercooked centers.

http://www.marlerclark.com/case_news/view/finley-elementary-school-e-coli-outbreak-washington

CENTER AWARDED TO K-STATE

February 4, 2010



April 15, 2011



CENTER LEADERSHIP



Kevin R.
Roberts, PhD
Associate
Professor



Kevin L. Sauer,
PhD, RDN, LD
Associate
Professor



Carol Shanklin,
PhD, RD
Professor

CENTER STAFF



Kerri Cole
Project
Coordinator



Paola Paez, PhD
Research Associate
Professor

Graduate Research Assistants

Michelle Alcorn, MS

Tracee Watkins, MBA

PARTNERSHIP



RECENT SCOPE OF WORK

- 2011 Health Inspections
- 2011 Cooling of School Foods
- 2012 Food Safety Plan Guidance Document
- 2012 Food Safety Plan Implementation
- 2013 Produce Wash
- 2014 Allergy Management
- 2014 Field Trip Food Safety
- 2015 Cooling of School Foods – Phase II
- 2015 Exploration of Food Safety and Food Waste
- 2016 Food Safety during Offsite Service
- 2016 Employee Behavior Assessment, I & II
- 2016 Milk Temperatures for Alternative Service Styles
- 2018+ Food Defense, Biosecurity, Food Allergy, and more



- www.cnsafefood@ksu.edu
- **Social Media**
 - Facebook
 - LinkedIn
 - Twitter@cnsafefood



FOOD COOLING

SLOW COOLING - OUTBREAK FACTOR

From 1998-2008

516

Known Cause

219

Cause Unknown

Factor in

735

Total Outbreaks

MMWR, 2013

TWO COOLING STUDIES

- 2011 Passive Cooling of products from
Endpoint cooking temperatures
- 2015 Passive Cooling of products from
Hot holding temperatures

COOLING STUDY: OBJECTIVES

1. Compare the effectiveness of cooling methods commonly used to determine if they meet Food Code standards.
2. Develop recommendations.

WHAT ARE THE COOLING GUIDELINES?

FDA FOOD CODE

- Cooked potentially hazardous food (time/temperature control for safety food) shall be cooled within 2 hours from 135°F to 70°F; and
- Within a total of 6 hours from 135°F to 41°F or less

FDA FOOD CODE

- 3-5013.15
 - Placing the FOOD in shallow pans
 - Separating the FOOD into smaller or thinner portions
 - Using rapid cooling EQUIPMENT
 - Stirring the FOOD in a container placed in an ice water bath
 - Using containers that facilitate heat transfer
 - Adding ice as an ingredient
 - Other effective methods

COOLING STUDY: METHODS

- Four food products were tested:
 - Chili con Carne with Beans (USDA #D-20)
 - Steamed Rice (USDA #B-03)
 - Beef Taco Meat (USDA #D-13)
 - Tomato Sauce (Meatless) (USDA #G-07)

COOLING STUDY: METHODS

- Cooling Treatments
 - Walk-in cooler (uncovered)
 - Walk-in cooler (uncovered) with an ice bath
 - Walk-in cooler (uncovered) with the use of a chill stick (chili and tomato sauce only)
 - Walk-in freezer (uncovered – rice excluded)

COOLING STUDY: METHODS

- Mean cooling time per treatment
 - 3 replications conducted per treatment
 - Means compared with Food Code standards
- Cooling curve graphs for each food product
 - **Temperature** (y axis) plotted over **time** (x axis)
 - Shows all data points for each cooling treatment
 - Visual comparison of treatments

ACCURACY

Calibrate the thermometers



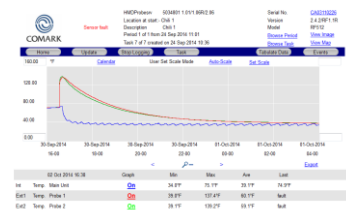
Find the center of the product



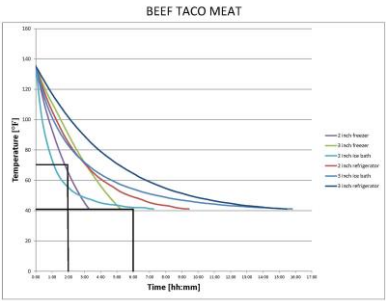
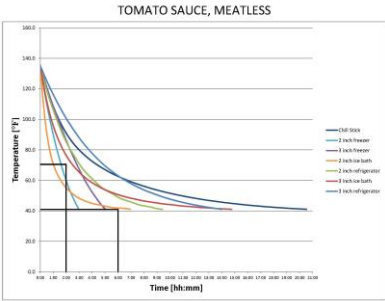
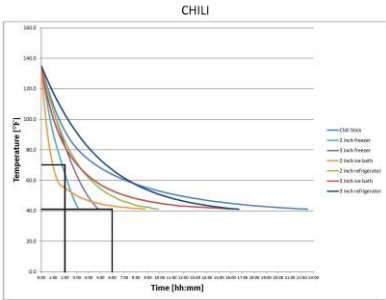
Portion and plate the product

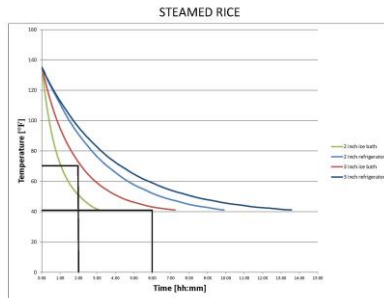


Chill



RESULTS





WHAT WORKS?

- Food products starting at 165°F or greater
 - NOT EFFECTIVE
 - Passive Chill stick usage NOT effective.
 - Ice bath NOT effective for ANY products at 3" depths.
 - Freezer NOT effective for any products at 3" depths.
 - NO refrigerator treatments were effective at 2" and 3" depths for any food product.
 - EFFECTIVE
 - Freezer effective for products at 2" depths.
 - Ice bath effective for steamed rice at 2" depths.



HACCP IMPLEMENTATION

HACCP PROGRAM STUDY: OBJECTIVES

- Determine how school districts have implemented food safety programs based on HACCP principles.
- Specific objectives:
 1. Evaluate the implementation of food safety programs, including: using SOPs; grouping menu items; identifying and documenting control measures and critical limits; using monitoring procedures; identifying corrective actions; and keeping records.
 2. Determine foodservice employees' food-handling practices related to food safety.

HACCP PROGRAM STUDY: METHODS

- **Summary of study**
 - 11 small districts in six states, nine medium districts in seven states, six large districts in six states, and eight mega districts in seven states. 34 schools.
- **Four areas of assessment**
 - **Facility Observation** - general food safety practices, handwashing, food storage, temperature control, protection from contamination, and dishwashing.
 - **Food Safety Observation** - employee handwashing, general food handling, cleaning and sanitizing.
 - **HACCP Verification** - Food Safety Program, training for personal hygiene, cleaning and sanitizing, and use of chemicals and standard operating procedures. Other assessment included menu item grouping, identification and documentation of control measures and critical limits, established monitoring procedures, and records.
 - **Hand Washing Facility Assessment** - restroom facilities for students.

KEY FINDINGS - OVERALL

- HACCP plans and documentation
- Food safety training
- Storage temperatures
 - Cold food held, some improvement
- Employee health/other
 - Food & beverages
 - Bare hand contact
- Dishmachines/utensils/cleaning

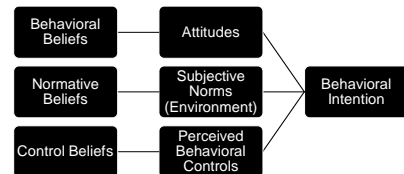
KEY FINDINGS - HANDWASHING

- 31 school managers trained on personal hygiene and proper cleaning and sanitizing.
- 29 schools documented a Standard Operating Procedure for handwashing.
- Nearly all (36) hand washing facilities were conveniently located and accessible for employees
- However...

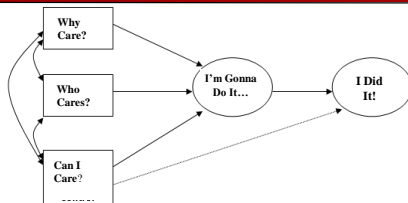
Employee Handwashing Practices					
Observed Activity	Total Observations	Number (%)			
		Employee observed washing hands <i>properly</i> and as required	Employee observed washing hands <i>improperly</i>	Employee observed <i>failing</i> to wash hands when required	
Immediately before engaging in food prep	137	51 (37.2)	30 (21.9)	56 (40.9)	
Before donning new gloves or changing gloves	144	39 (27.1)	31 (21.5)	74 (51.4)	
After soiling hands during food preparation or service activities	104	18 (17.3)	20 (19.2)	66 (63.5)	
After handling soiled equipment, dishes or utensils	97	7 (7.2)	17 (17.5)	73 (75.3)	
After touching body parts, coughing/sneezing; blowing nose; eating or drinking	79	3 (3.8)	12 (15.2)	64 (81.0)	
Switching between handling raw animal foods and ready-to-eat foods	6	4 (66.7)	1 (16.7)	1 (16.7)	
Other	8	0 (0.0)	0	8 (100.0)	
Total Observations	575	122 (21.2)	111 (19.3)	342 (59.4)	

CHANGING BEHAVIORS

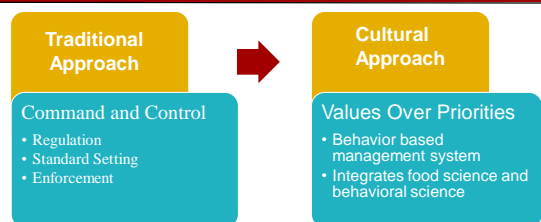
Theory of Planned Behavior



SIMPLIFIED THEORY OF PLANNED BEHAVIOR



LEADING FOOD SAFETY



Can the **non-knowledge** drivers of food safety behavior be used to enhance better training?

STORYTELLING FOR IMPROVED FOOD SAFETY

CONSUMER FOOD SAFETY

IMPACT OF FOOD SAFETY MESSAGES ON THE FOOD HANDLING BEHAVIORS OF PARENTS OF YOUNG CHILDREN

OBJECTIVES

- Identify food handling practices of consumers
- Determine the impact of **Food Safe Families** messages (clean, separate, cook, and chill) on:
 - Food handling practices
 - Microbiological profile of prepared food and food preparation environment
- Examine the extent of cross contamination

SAMPLE

- 120 Parents
 - Between 20-45
 - Prepare 4 or more meals at home each week
 - Have at least one child who is less than 13
 - Speaks English
- Recruited from Manhattan, KS area
- \$50 gift card

EXPERIMENTAL DESIGN

- Control Group (n=40)
- Group 1 (n=40)
 - Received 1 hour training on **Food Safe Families** content: clean, separate, cook, chill
 - Handouts
- Group 2 (n=40)
 - Viewed Ad Council video messages and discussed the meaning of those messages

PROCEDURES

Participants:

- Participated in training session
- Asked to participate in a project to develop quick and easy "kid friendly" recipes
- Completed a cooking session
- Completed food handling practices questionnaire
- Debriefed

DATA COLLECTION SITE

- Condo used only for project
- Equipped with four small cameras



VIDEO RECORDING



RECIPES

- Entrée, contains raw egg
 - Baked Herbed Chicken Nuggets (165 degrees F)
 - World's Fastest Meatballs (160 degrees F)
- Salad—Super Easy Fruit Salad



TRACER ORGANISM

- Used *Lactobacillus casei*, a non-pathogenic bacteria to track cross contamination
- Ground beef and chicken inoculated prior to food preparation
- Known quantity of inoculate

SANITIZED KITCHEN

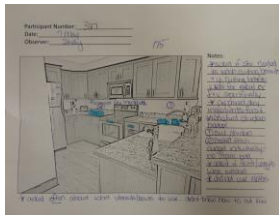


MICRO SAMPLES

- Fresh Fruit Salad
- Handles
 - Sink
 - Refrigerator
 - Oven
 - Trash drawer
 - Salt Shaker
- Towels
 - Small (dish cloth)
 - Large (hand towel)
 - Countertops (2)



KITCHEN DIAGRAM



KEY FINDINGS

- About 90% of ready-to-eat salads were contamination with *L. casei*, with 24% being heavily contaminated
- Kitchen towels were largest source of contamination
- Greater than 82% left contamination on all handles

KEY FINDINGS, CONT.

- About half washed hands before food preparation
- Over half either did not wash or rinsed hands after handling meat packaging and throwing away trash
- Most hand washing did not follow guidelines—warm water, soap, 20 seconds
- Cloth towels used often, paper towels sometimes used more than once

KEY FINDINGS, CONT.

- 80% of countertop samples showed contamination
- 16% did not wash strawberries
- 90 participants used a food thermometer, and 26 of them did so incorrectly
- Cooking temperature on recipe served as a cue, participants asked researcher how to take temperatures

